Dear Reviewer,

Thank you for your insightful comments and valuable suggestions on our manuscript. We have carefully studied each point and will address them all in the revised version. Our detailed responses and revision plans are as follows:

1. Explanation on using 8-day composite data instead of daily data

You have raised a highly relevant and critical question. In fact, this issue was carefully evaluated in our work. We chose the MODIS 8-day composite land surface temperature product (rather than daily data) mainly for the following two reasons:

• **Data quality:** The study area (the Dingri region of the Tibetan Plateau) is perennially affected by frequent and extensive high cloud cover, resulting in a large amount of data gaps (NaN values) in daily images. The 8-day composite data averages valid observations within the period, which can significantly reduce cloud noise and provide a more continuous and reliable data series for trend analysis.

• **Research objective and computational efficiency:** This study aims to analyze nearly a decade of time-series data from 2016–2025 to extract possible pre-seismic thermal anomalies. Using daily data would result in an extremely large dataset containing substantial invalid information due to cloud cover, imposing unnecessary computational burden and interference on the subsequent STL time-series decomposition. The 8-day composite data effectively preserves the overall temperature trend while balancing data quality and processing efficiency, making it more suitable for detecting large-scale, long-term background anomalous signals in this study.

2. Explanation on the choice of the ALICE index within the RST methodology

Thank you for directing our attention to literature such as Eleftheriou et al. (2016) and the RETIRA index. We explain our methodological choice as follows:

This study employs the ALICE index for thermal infrared anomaly detection, primarily based on its proven effectiveness, regional adaptability, and alignment with our research objectives:

• **Validation of effectiveness:** As a well-established index within the RST framework, the reliability of ALICE in seismic thermal anomaly research has been widely validated. For instance, Jiang et al. (2025) systematically evaluated multiple parameter responses, including ALICE, across major global earthquake cases. Studies by Du and Sun (2022) in Xinjiang, China, and Wang et al. (2023) in the Sichuan-Yunnan region of China have successfully applied ALICE to identify significant thermal anomalies related to tectonic activity. These works provide a solid foundation for our methodological choice.

• **Regional adaptability:** The study area (Tibetan Plateau) has a unique climate with intense seasonal fluctuations in surface temperature. The ALICE index performs robustly in stripping away the background field and enhancing potential anomalous signals, helping to distinguish genuine tectonically related thermal perturbations from strong seasonal variations.

• **Compatibility with the existing analytical workflow:** We note that RETIRA aims to remove seasonal signals by establishing a historical baseline, a core objective aligned with the STL time-series decomposition method we adopted. The STL method can non-parametrically and finely decompose seasonal, trend, and residual (anomaly) components from time-series data simultaneously, particularly suitable for potentially non-stationary signals in plateau regions. This decomposition provides a more flexible and thorough data foundation for our subsequent analysis of the spatiotemporal relationship between anomalous signals and fault structures. Therefore, the current "STL decomposition + ALICE index" framework is robust and suitable for the objectives of this study.

We again thank you for the suggestion regarding RETIRA, which offers important guidance for our future systematic methodological comparison studies.

3. Explanation on thermal anomaly attribution and analysis of the 2025 major earthquake sequence

We concur with your observation that the issue is of vital importance, and we strongly endorse the imperative for rigorous anomaly attribution.

• **Rigor in anomaly attribution:** We do not simply attribute all anomalies within the study period to the target mainshock. In our analysis, we strictly focus on the seismogenic fault, prioritizing examination of anomalous signals most closely coupled in time and space with the mainshock (i.e., approximately 6 months before to 1 month after the earthquake, and spatially distributed along the fault zone). This helps minimize interference from contemporaneous distant or unrelated seismic events. We acknowledge the possibility of superimposed signals from multiple sources and will add discussion in the manuscript to clearly elaborate on this limitation.

• **Analysis of the 2025 major earthquake sequence:** Your suggestion to utilize its complete foreshock-aftershock sequence to trace thermal anomaly dynamics is highly valuable. Our current method, based on long-term trend decomposition, is more adept at capturing background, cumulative thermal anomaly signals but has limited capability to capture instantaneous responses of short-term sequences. Therefore, this paper did not finely characterize such aspects. This has clearly become a focus for our follow-up research: we plan to employ higher temporal-resolution data combined with analytical methods optimized for short-term signals to specifically study the thermal radiation evolution of the entire sequence of such major earthquakes, aiming to establish a more dynamic anomaly-fault activity relationship.

4. Commitment to other textual and detail revisions

We have fully noted all other revision suggestions you provided and will strictly implement the modifications:

• **Literature citations:** We will incorporate the recommended studies by Kouli et al. (2021), Filizzola et al. (2022), and Peleli et al. (2022) into the introduction and discussion sections to better situate this study within the scholarly context.

• **Abstract and structure:** The abstract will be rewritten to clearly mention both earthquakes. The "Basic Earthquake Parameters and Study Area Overview" section will be expanded to fully introduce the characteristics of both earthquakes.

• **Terminology and expressions:** "Dingri" will be used consistently throughout as the place name. Specific examples of different types of thermal anomaly changes will be added in lines 80–85.

• **Figure errors:** The issue of identical subfigure titles in Figure 6 will be corrected.

Your comments have significantly enhanced the rigor and clarity of this study, for which we are sincerely grateful.

Sincerely,

Wanyi Li & Dan Tao

Du, C., & Sun, K. (2022). [Seismic thermal anomaly analysis in Yutian region of Xinjiang based on multi-source remote sensing data at different spatiotemporal scales]. *Earthquake*, 42(3), 37–51.

Eleftheriou, A., Filizzola, C., Genzano, N., et al. (2016). Long-term RST analysis of anomalous TIR sequences in relation with earthquakes occurred in Greece in the period 2004–2013. *Pure and Applied Geophysics*, *173*, 285–303. https://doi.org/10.1007/s00024-015-1116-8

Jiang, M., Jing, F., & Zhang, L. (2025). Evaluating multiparameter response to seismic thermal anomalies from global major earthquakes. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, *18*, 11835–11850. https://doi.org/10.1109/JSTARS.2025.3563992

Wang, X., Cui, J., Wang, L., et al. (2023). [Feasibility study on methane seismic monitoring in local areas of Sichuan-Yunnan region: Taking the September 2021 Luxian M6.0 earthquake in Sichuan as an example]. *National Remote Sensing Bulletin*, 27(7), 1731–1743.